

**ASBESTOS ABATEMENT SPECIFICATIONS**  
**South Texas Veterans Health Care System**  
**Audie L. Murphy Memorial VA Hospital**  
**7400 Merton Minter**  
**San Antonio, Texas 78229**  
**for**  
**RH Shackelford, Inc.**

**SECTION 1 - SUMMARY OF THE WORK**

**GENERAL**

**1.1. WORK COVERED BY CONTRACT DOCUMENTS**

**A.** Drawings and General Provisions of the Contract, including the General and Supplementary Conditions, and other Division 1 Specification Sections, apply to all Sections herein.

**B.** The Project consists of:

- 1.** Abatement of previously identified asbestos containing building materials (ACBM) prior to renovation.
- 2.** The ACBM and approximate quantities are based on an inspection report provided by Argus Environmental Consultants, Inc. Notwithstanding the results of the inspection, STVHCS has chosen to treat all Thermal System Insulation (TSI) within M003 as asbestos containing building materials.
- 3.** The TSI covers pipes ranging from 2 to 24 inches in diameter. Approximately 2000 linear feet is present; **however, the abatement contractor must verify the quantity for bidding purposes.** There will be no adjustments to the bid for failure to comply with these specifications.
- 4.** In general, the methodology below will be followed:
  - a.** Component removal, glove bagging, with full containment as appropriate.
  - b.** As appropriate, negative pressure will be used with a minimum of -0.02 inches w.g. maintained.
  - c.** Three (3) chamber decontamination unit with flaps between chambers will be used if containment is used.
  - d.** Disposable coveralls and ½ face piece respirators with P-100 filters will be worn. If a chemical is used for removing glue or another substance, organic vapor cartridges will be stacked with the P-100 filters.



e. Amended water (water with a surfactant added) will be used.

f. Disposal requirements are provided in Section 11.

### C. Project information.

**1. Project Location:** 7400 Merton Minter, San Antonio, Texas 78229.

**2. Owner:** South Texas Veterans Health Care System, Audie L. Murphy Memorial VA Hospital, 7400 Merton Minter, San Antonio, Texas 78229.

**3. Owner's Representative:** Mr. Terry E. Meeker, 7400 Merton Minter, San Antonio, Texas 78229, telephone (210) 617-5300 ext 15170. The abatement contractor will act as the owner's representative for the TDSHS Notification preparation and submittal to include amendments. Copies must be provided to Mr. Terry Meeker and AEHS.

**4. Removal:** *See Section 10 - Removal of Asbestos-Containing Materials, for details.*

**5. The Technical Specifications were prepared by:** AEHS, Inc. (TDSHS License No. 10-0335), 4402 Center Gate, San Antonio, Texas 78217, (ph) 210-656-9300, (fax) 210-656-8499.

## 1.2. WORK UNDER OTHER CONTRACTS

**A.** The Owner or Owner's Representative/Contracting Services has awarded a separate contract for the collection and analysis of samples for airborne asbestos fibers and project management [as defined under the Texas Administrative Code (Texas Asbestos Health Protection Rules, §295.49)].

**B.** Cooperate fully with any separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

## 1.3. WORK SEQUENCE

The Work will be conducted continuously as appropriate and commensurate with the renovation.

## 1.4. ASBESTOS-CONTAINING MATERIALS

**A.** The work involves activities that will disturb asbestos-containing materials (ACM) as stated in paragraph 1.1B, above.

**B.** If any other ACM or presumed asbestos-containing material (PACM) is encountered, notify the Owner and your employees about the location and quantity within 2 hours of the discovery.

## 1.5. HEALTH RISK



A. The disturbance or dislocation of ACM may cause fibers to be released, thereby creating a potential health risk to workers. Apprise all workers and supervisory personnel of the seriousness of the risk and of proper work procedures which must be followed.

B. Where in the performance of the work, workers or supervisory personnel may encounter, disturb, or otherwise function in the immediate vicinity of any identified ACM, take appropriate continuous measures as necessary to protect all building occupants from the risk of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with all TDSHS, AHERA, and NESHAPS regulations as well as applicable federal, state and local agencies requirements.

## 1.6. CONTRACTOR USE OF PREMISES

A. Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the work is indicated.

B. Adhere to the following guidance:

1. Smoking or open fires will not be permitted within the building enclosure or on the premises except at designated locations.
2. Use of existing toilets within building by the Contractor's personnel is acceptable, provided it is not impacted by the abatement and water is available; however, the removal of Personal Protective Equipment and decontamination must be accomplished prior to such use. Therefore, use within a unit/area being abated is not acceptable.

## 1.7. AIR MONITORING AND PROJECT MANAGEMENT

A. The Owner's Representative has contracted an independent Asbestos Consulting Agency (AEHS, Inc.) to conduct baseline and area air monitoring and to provide project management. The Consulting Agency will ensure that all operations are conducted IAW these specifications and within the requirements of TDSHS, EPA, and OSHA. The air sampling and clearance strategy will be in accordance with AHERA and TAHPR [295.58 (i)] for baseline, ambient, and clearance as appropriate for the type of work being performed.

**B. Work Area Clearance:** Upon notification by the Asbestos Abatement Supervisor, AEHS's representative will conduct a visual inspection for the presence of mastic. The supervisor will accompany AEHS's representative during the visual inspection. If visual clearance is achieved the project will then go to the next stage of clearance to include air sampling using aggressive methods. Matthew Bishop, Matthew Louderback, or Mike Kauffman are delegated the authority to conduct visual clearances for this project.

**C. Personal Air Sampling:** Air monitoring required by OSHA is the responsibility of the Contractor. However, the contractor may request this service through AEHS, Inc., by separate contract.



**D. NESHAPS Sampling.** NESHAPS sampling is not appropriate for this abatement activity.

## **1.8. LABORATORY TESTING.**

AEHS will conduct laboratory analyses of the asbestos air samples. A microscope and technician will be setup at the job site, or be readily available, so that verbal reports on PCM air samples can be obtained as soon as possible. Only TDSHS licensed laboratories – to wit AEHS – will be used and personnel participating in AIHA's Proficiency Analytical Testing rounds will perform the analysis. The final TEM clearances will be performed by EHS Services, Inc., using a TDSHS licensed and AIHA certified TEM laboratory.

## **1.9. STOP WORK**

**A.** If the owner's or AEHS's representative presents a written stop work order, immediately and automatically conform to that stop work order, while maintaining temporary enclosures and pressure differential. Do not recommence abatement work until authorized in writing.

**B.** After being presented with a stop work order immediately:

1. Cease all removal activities, or any other activities that disturbs ACM.
2. Change methods of removal.
3. Maintain in operation all work regulated areas.
4. Maintain all worker protections.
5. Do not restart until provided a written re-commence order by AEHS.

**END OF SECTION – 1**

## **SECTION 2 - COORDINATION**

### **GENERAL**

#### **2.1. SUMMARY**

This Section includes administrative and supervisory requirements necessary for coordinating operations.

#### **2.2. COORDINATION**

Where necessary, the Contractor will prepare a memorandum for distribution to each party involved in the abatement process. Outline special procedures and precautions required for visiting the work site. Non-



asbestos licensed personnel are not allowed into any containment.

### 2.3. PLAN OF ACTION (WORKPLAN)

A detailed plan of the procedures for use in complying with the requirements of this specification is not required to be submitted for prior approval; however, one must be on site and will be approved and/or modified at the beginning/commencement of the work. Include in the plan the sequencing of work, the interface of trades involved in the performance of work, safety procedures, disposal plan including location of approved disposal site, and a detailed description of the methods to be employed to control pollution. OR, these specification requirements can be used in total for the workplan if a written and signed statement is attached stating such.

### 2.4. NOTIFICATIONS

**STVHCS DELEGATES TO THE ABATEMENT CONTRACTOR, AS THE OWNER'S AGENT, THE TASK OF PREPARING AND SUBMITTING, IN ACCORDANCE WITH (IAW) THE TAHPR (295.61), THE TEXAS DEPARTMENT OF STATE HEALTH SERVICES (TDSHS) 10-DAY NOTIFICATION. COPIES WILL BE PROVIDED TO AEHS AND THE OWNER.**

**FAILURE OF THE CONTRACTOR TO PROVIDE PROJECT UPDATE AND TIMELY INFORMATION CONCERNING THE NOTIFICATION, WHICH RESULTS IN TDSHS PENALTIES, WILL BE THE RESPONSIBILITY OF THE ABATEMENT CONTRACTOR TO ABSORB THE ASSOCIATED STVHCS COSTS RELATED TO PROCESSING THE PENALTY AND THE PENALTY ITSELF. IT IS THE RESPONSIBILITY OF THE ABATEMENT CONTRACTOR TO DETERMINE IF THE NOTIFICATION NEEDS TO BE EXTENDED OR TERMINATED AND PROVIDE AMENDMENTS AS APPROPRIATE AND IAW THE TDSHS RULES.**

### 2.5. PRE-ABATEMENT INSPECTION

A joint inspection of the area in which work will be performed, prior to commencement of work. Verification of quantities must be conducted at this time and any differences will be forwarded to STVHCS and AEHS within 2 days.

### 2.6. WORKER AND SUPERVISORY PERSONNEL

**A. Project Supervisor:** Provide a full-time Project Supervisor at the work site who is experienced and is a TDSHS licensed supervisor. The Project Supervisor will perform administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, project scheduling, management, etc. This person is the Contractor's Representative, and will function as the "competent person" at the work site responsible for compliance with all applicable TDSHS regulations. The TDSHS requires the Asbestos Project Supervisor to be in containment at least 25% of the time. This must be documented on the daily log.



**B. Workers:** All workers must comply with the TDSHS requirements and adhere to the industry's standards of practice.

**C. Asbestos Training:** All personnel must have current training provided by a TDSHS licensed training provider.

**D. TDSHS License:** The Project Supervisor and Workers must hold current TDSHS licenses/registrations, be up to date on all medical requirements, participate in a respiratory protection program, and have a fit test record within the past twelve (12) months.

**E. Competent Person:** The Project Supervisor is to be the Competent Person as required by OSHA in 29 CFR §1926.1101 and NESHAPS.

## 2.7. PRE-ABATEMENT CONFERENCE

A Pre-Abatement Conference will be convened by AEHS prior to start of any work. Meet at the project site, or as otherwise directed, with Project Supervisor and other entities concerned with the abatement work.

## 2.8. COORDINATION MEETINGS

It is not anticipated that coordination meetings will be required. However, the contractor will send the Supervisor to any meeting deemed necessary by the Owner/Owner's representative or AEHS.

## 2.9. RECORD KEEPING

**A. Daily Log:** The Contractor will maintain a Daily Log (in an area accessible to the Owner/Owner's representative and AEHS) as a bound, sequential, hand-written record carefully prepared daily that documents but is not limited to the following items:

1. Meetings - purpose, attendees, and brief discussion.
2. Special or unusual events, i.e. barrier breeching, equipment failures, accidents, **visits by TDSHS or other regulatory agencies such as OSHA.**
3. Supervisors time within containment. The TDSHS rules [295.58, (b)(3)] require the supervisor to be within containment at least 25% of the time.
4. Contractors final inspection.

**B. Entry/Exit Log:** Personnel - by name, entering and leaving the work area with the following:

1. Printed Name.



2. Identification Number.
3. Entry and Exit Times.
4. Respiratory Protection

**C. Air Monitoring Results:** Post personnel and area air monitoring results at a location accessible by the workers.

**D. Records:** Maintain the following documentation at an area accessible by the workers.

1. Documentation of inspections by OSHA, EPA or local authority.
2. Respiratory Protection Program.

**E. Other records:** Maintain other documentation in a location that is accessible to the Owner and Owner's Representative including:

1. Waste Manifests and shipping records.
2. Landfill receipts.
3. Accident reports.
4. Letters to Recyclers/Scrap Yards.

## 2.10. SPECIAL REPORTS

**A. General:** Except as otherwise indicated, submit special reports directly to Owner's Representative/ Consulting Agency within one day of occurrence requiring a special report.

**B. Reporting Unusual Events:** When an event of unusual or significant nature occurs at site, prepare and submit report. List of chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise the Consulting Agency's Representative in advance at earliest possible date.

**C. Reporting Accidents:** Prepare and submit reports of significant accidents, at the site and anywhere else work is in progress and forward a copy immediately to AEHS and the Owner's Representative. Record and document data and actions; comply with industry standards; and comply with OSHA. For this purpose, a significant accident is defined to include events where personal injury is sustained, property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury, or where work was stopped for over four hours during a scheduled shift eight hour shift.

**D. Report Discovered Conditions:** When an unusual condition of the building is discovered during the work (leaks, termites, corrosion) prepare and submit a notification indicating condition discovered.



## 2.11. SUBMITTALS

**A. Before the Start of Work:** Have on the job the following:

1. Copies of all personnel training records, medical clearances, respirator fit testing, and licenses.
2. Copy of the specifications.
3. Copy of the documents specified in the Texas Asbestos Health Protection Rules.

**B. Project Close-out:** Submit two (2) copies for information purposes of all documents indicated in the following sections at final closeout of project as a project close-out submittal.

FINAL PAYMENT WILL NOT BE MADE UNTIL ALL SUBMITTALS ARE PROVIDED TO THE OWNER'S REPRESENTATIVE.

1. Section on Record Keeping.
2. Section on Special Reports.
3. All Air Sample results.
4. Transportation and Disposal Manifest.
5. Letters to Recyclers/Scrap Yards.

**END OF SECTION - 2**

## SECTION 3 - REFERENCE STANDARDS AND DEFINITIONS

### GENERAL

#### 3.1. DEFINITIONS

**A. General:** Basic contract definitions are included in the Conditions of the Contract or other standard contract language and as found in the Asbestos related EPA, OSHA, and TDSHS regulations/rules and Asbestos Regulatory Clarifications.

#### 3.2. INDUSTRY STANDARDS

**A. Applicability of Standards:** Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the





Contract Documents by reference.

**B. Publication Dates:** Comply with the standards in effect as of the date of the Contract Documents.

**C. Conflicting Requirements:** Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer any questions to AEHS for a decision, before proceeding, on requirements that are different and where it is uncertain which requirement is the most stringent.

### END OF SECTION – 3

## SECTION 4 - CODES, REGULATIONS AND STANDARDS

### GENERAL

#### 4.1. SUMMARY

**A.** This section sets forth governmental regulations which are included and incorporated herein by reference and made a part of the specification. This section also sets forth those notices and permits which are known to the Owner and which either must be applied for and received, or which must be given to governmental agencies before start of work.

1. Requirements include adherence to work practices and procedures set forth in applicable codes, regulations and standards.
2. Requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with codes, regulations, and standards.

#### 4.2. CODES, REGULATIONS, AND STANDARDS

**A. General Applicability of Codes, Regulations and Standards:** Except to the extent that more explicit or more stringent requirements are written directly into the Contract Documents, all applicable codes and regulations have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the Contract Documents, or as if published copies are bound herewith.

**B. Contractor Responsibility:** The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, transportation, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner, and AEHS, Inc., harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of the contractor, the contractor's employees, or subcontractors.



**C. Federal Requirements:** Regulations which govern asbestos abatement work or transportation and disposal of asbestos or lead-based paint waste materials include but are not limited to the following:

**1. OSHA:** U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:

**a.** Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite; Final Rules Title 29, Part §1910, Section 1001 of the Code of Federal Regulations Final Rules Title 29, Part §1926, Section 1101 of the Code of Federal Regulations.

**b.** Respiratory Protection

Title 29, Part §1910, Section 134 of the Code of Federal Regulations

Title 29, Part §1926, Section 103 of the Code of Federal Regulations

**c.** Personal Protective Equipment for General Industry

Title 29, Part §1910, Subpart I of the Code of Federal Regulations

Title 29, Part §1926, Sections 95 - 107 of the Code of Federal Regulations

**d.** Access to Employee Exposure and Medical Records

Title 29, Part §1926, Section 33 of the Code of Federal Regulations

**e.** Hazard Communication

Title 29, Part §1926, Section 59 of the Code of Federal Regulations

Title 29, Part §1910, Section 1200 of the Code of Federal Regulations

**f.** Specifications for Accident Prevention Signs and Tags

Title 29, Part §1910, Section 145 of the Code of Federal Regulations

**g.** Permit Required Confined Space

Title 29, Part §1910, Section 146 of the Code of Federal Regulations

**h.** Construction and General Industry

Title 29, Part §1910, Section 1001 of the Code of Federal Regulations

Title 29, Part §1926, Section 1101 of the Code of Federal Regulations

**i.** Construction Industry - General Duty Standards

Title 29, Part §1926, Sections 20 through 35 of the Code of Federal Regulations

**2. DOT:** U. S. Department of Transportation, including but not limited to:

**a.** Hazardous Substances

Title 49, Part 171 and 172 of the Code of Federal Regulations



**b. Hazardous Material Regulations**

General Awareness and Training Requirements for Handlers, Loaders and Drivers  
Title 49, Parts 171-180 of the Code of Federal Regulations

**c. Hazardous Material Regulations**

Editorial and Technical Revisions ,Title 49, Parts 171-180 of the Code of Federal Regulations

**3. EPA:** U. S. Environmental Protection Agency (EPA), including but not limited to:

**a. Asbestos Abatement Projects; Worker Protection Rule**

Title 40 Part 763, Sub-part G of the Code of Federal Regulations

**b. Asbestos Hazard Emergency Response Act (AHERA) Regulation Title 40, Part 763, Sub-part E of the Code of Federal Regulations**

**c. EPA Model Accreditation Plan - Asbestos Containing Materials Final Rule & Notice Title 40, Part 763, Sub-part E, Appendix C of the Code of Federal Regulations**

**d. National Emission Standard for Hazardous Air Pollutants (NESHAP), National Emission Standard for Asbestos Title 40, Part 61, Sub-part A, and Sub-part M (Revised Sub-part B) of the CFR.**

**4. State Requirements:** State regulations/rules which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following: Texas Department of State Health Services Texas Asbestos Health Protection Rules (TAHPR) Part 295 (as updated effective December 13, 1998 with latest publication as of June 1999).

#### **4.3. NOTICES**

##### **A. TEXAS DEPARTMENT OF STATE HEALTH SERVICES**

The Abatement Contractor will submit the TDSHS notification and all amendments thereto.

#### **4.4. PERMITS**

**A.** All asbestos containing waste to be transported by an entity maintaining a current "industrial waste hauler permit" and "hazardous/special/asbestos waste hauler permit" specifically for ACM is required to include a TDSHS Asbestos Waste Transporter's License.

**B.** Contractor is responsible for obtaining any demolition, building, renovation or other permits, and for paying application fees, if any, where required by State or Local jurisdictions.

#### **4.5. LICENSES**



Maintain current licenses as required by applicable state or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract.

#### **4.6. POSTING AND FILING OF REGULATIONS**

**Posting and Filing of Regulations:** Post all notices required by applicable federal, state and local regulations and maintain one copy of these federal, state and local regulations and standards at the job site.

**END OF SECTION – 4**

### **SECTION 5 - TEMPORARY FACILITIES**

#### **GENERAL**

##### **5.1. SUMMARY**

**A. Controls:** This Section includes requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection. The Contractor will ensure that all ladders and scaffolding comply with the following regulations:

1. 29 CFR §1910.25 - Portable Wood Ladders.
2. 29 CFR §1910.26 - Portable Metal Ladders.
3. 29 CFR §1910.28 - Safety Requirements for Scaffolding.

**B. Temporary utilities include, but are not limited to, the following:**

1. Water service and distribution.
2. Temporary electric power and light. Request the General Contractor to provide the power.
3. Ventilation.
4. Sanitary facilities, including drinking water.

**C. Support facilities include, but are not limited to, the following:**

1. Field offices (optional).
2. Temporary enclosures (optional).

**D. Security and protection facilities include, but are not limited to, the following:**



1. Temporary fire protection in accordance with 29 CFR §1910.157 - Portable Fire Extinguishers.
2. Barricades, warning signs, and lights.

## 5.2 DESCRIPTION OF REQUIREMENTS

The Contractor shall provide temporary connection to existing building utilities or provide temporary facilities as required herein or as necessary to carry out the work at the request to the owner.

## 5.3. QUALITY ASSURANCE

**A. Regulations:** Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

**B. Standards:** Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NEC Electrical Design Library "Temporary Electrical Facilities."

**C. Electrical Service:** Comply with NEMA, NEC, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code."

### **D. Quality Assurance Responsibilities:**

1. Before exposure to ACM contaminated fiber dust, Contractor must provide workers with a comprehensive medical examination as required by 29 CFR §1926.1101 (m) (1) (I) (A) & (B). Medical examinations must be current (within the past 12 months).
2. Before exposure to ACM contaminated airborne dust or fibers, Contractor must provide fit testing for all workers that must wear respirators.
3. Medical Records: Contractors must maintain complete and accurate medical records of workers in accordance with 29 CFR §1910.20.



4. **Training:** Each employee performing asbestos removal, disposal, and air sampling operations shall receive training prior to the time of initial job assignment, in accordance with and 29 CFR §1926.1101 (k)(9)(ii).
5. **Training Certificates:** Certificates will be submitted to the CIH at AEHS or his representative, by the Contractor for their asbestos worker training. Training certificates must be current.
6. **Contractor must submit their Respiratory Protection Program to AEHS (CIH or his representative).** The program must meet 29 CFR §1910.134 (as changed January 8, 1998) and §1926.1101 requirements including employees' fit testing, medical surveillance, and other specific requirements.
7. **Contractor must submit their Hazard Communication Program to the CIH or his representative.** The Hazard Communication Program must meet 29 CFR §1910.1200 and 29 CFR §1926.59 requirements.
8. **Contractor's Hazardous Waste Management Plans must meet all federal, state, and local laws, regulations, rules, and standards.**
9. **Contractor's Safety and Health Compliance must meet all Federal, State, and local health and safety regulations, rules and standards.**
10. **All the Quality Assurance and other Project Design Specification requirements will be reviewed with Contractor when AEHS meets for the Pre-Construction Conference.**

#### 5.4. PROJECT CONDITIONS

**Temporary Utilities - Conditions of Use:** Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.

#### 5.5. ELECTRICAL SERVICE

**A. General:** Comply with applicable NEMA, NEC and UL standards and governing regulations for materials and layout of temporary electric service.

**B. Electrical Outlets:** Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-Volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters (GFCI), reset button, and pilot light for connection of power tools and equipment. Place GFCI at the source of the current so that every piece of equipment down line is protected. Cutting or punching through the poly is not allowed.

**C. Electrical Power Cords:** Provide grounded extension cords. Use hard-service cords where exposed to



abrasion and traffic. Provide waterproof connectors to connect separate lengths if single lengths will not reach areas where activities are in progress. Do not exceed safe length-voltage ratio.

**D. Lamps and Light Fixtures:** Provide general service incandescent lamps or fluorescent lamps of wattage indicated or required for adequate illumination as required by the work of this section. Protect lamps with guard cages or tempered glass enclosures, where fixtures are exposed to breakage by construction operations. Provide vapor tight fixtures in work area and decontamination units. Provide exterior fixtures where fixtures are exposed to the weather or moisture.

## 5.6. FIRST AID

**First Aid Supplies:** Comply with governing regulations and recognized recommendations within the construction industry. The stockage of the kit should be based on anticipated type of injuries.

## 5.7. FIRE EXTINGUISHERS

**Fire Extinguishers:** Provide hand-carried, portable, UL-rated, Class A (or ABC) fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures. One fully operational extinguisher will be provided per 1000 square feet or area being contained, whichever is less.

## 5.8. MISCELLANEOUS

**A. Barricades, Warning Signs, and Lights:** Comply with standards and code requirements for erection of structurally adequate barricades.

**B. Environmental Protection:** Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted or that other undesirable effects might result.

**C. Mastic Remover.** Methylene chloride will not be used as a mastic/glue remover nor will any product with a flash point of less than 200 ° F.

## END OF SECTION – 5

## SECTION 6 -AIR CIRCULATION/FILTRATION SYSTEM

### GENERAL

#### 6.1. SUBMITTAL

**Before Start of Work:** Ensure compliance with the design for the air circulation/filtration system as indicated herein. Do not begin work until the AEHS agrees.



## PRODUCTS

### 6.2. HEPA FILTERED NEGATIVE AIR MACHINES

**A. General:** Supply the required number of HEPA filtered fan units to the site in accordance with these Specifications to maintain 0.02 inches w.g., negative pressure. Use units that meet the following requirements.

- 1. Cabinet:** Constructed of durable materials able to withstand damage from rough handling and transportation.
- 2. HEPA Filters:** Provide units whose final filter is the HEPA type with the filter media (folded into closely pleated panels) completely sealed on all edges with a structurally rigid frame.
  - a.** Provide units with a continuous rubber gasket located between the filter and the filter housing to form a tight seal.
  - b.** Provide HEPA filters that are individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent.
  - c.** Provide filters that are marked with: the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of test air flow.
  - d.** Pre-filters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. Provide units with the following pre-filters:
    - (1) First-stage pre-filter: low-efficiency type (e.g., for particles 100  $\mu\text{m}$  and larger).
    - (2) Second-stage (or intermediate) filter: medium efficiency (e.g., for particles down to 5  $\mu\text{m}$ ).
    - (3) Provide units with pre-filters and intermediate filters installed either on or in the intake grid of the unit and held in place with special housings or clamps.
  - e. Instrumentation:** Provide units equipped with:
    - (1) Magnehelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed.
    - (2) Elapsed time meter or log to show the total accumulated hours of operation.
  - f. Safety and Warning Devices:** Provide units with the following safety and warning devices or equivalent:





- (1) Electrical (or mechanical) lockout to prevent fan from operating without a HEPA filter.
- (2) Automatic shutdown system to stop fan in the event of a rupture in the HEPA filter or blocked air discharge.
- (3) Warning lights to indicate normal operation (green), too high a pressure drop across the filters (i.e., filter overloading - yellow), and too low of a pressure drop (i.e., rupture in HEPA filter or obstructed discharge - red). Audible alarm if unit shuts down due to operation of safety systems or continuous monitoring.

**g. Electrical Components:** Provide units with electrical components approved by the National Electrical Manufacturers Association (NEMA) and Underwriter's Laboratories (UL). Each unit is to be equipped with overload protection sized for the equipment as appropriately grounded.

## EXECUTION

### 6.3. AIR CIRCULATION IN THE WORK AREA

**A. Air Circulation:** For purposes of this section air circulation refers to the circulation and cleaning of air within the Work Area.

**B. Minimum Requirement:** Air circulation in the Work Area is a minimum requirement intended to help maintain airborne fiber and dust counts at a level that does not significantly challenge the work area isolation measures. The Contractor may also use this air circulation as part of the engineering controls.

### 6.4. AIR CIRCULATION IN DECONTAMINATION UNITS

**A. Air Circulation:** Continuously maintain air circulation in Decontamination Units at the same level as required for Work Area. However, under the specifications for floor tile and mastic removal, a full decontamination unit is not required; not withstanding negative pressure is still required unless RFCI methods are used.

**B. Air Movement:** Arrange air circulation through the Personnel Decontamination Unit (double flapped entrance ways) so that it produces a movement of air from the Clean Room through the Cleaning Room into the Equipment Room. At each opening, the airflow velocity must be sufficient to provide visible indications of air movement into the work area.

**END OF SECTION – 6**

## SECTION 7 - WORKER PROTECTION

### GENERAL



## **7.1. DESCRIPTION OF WORK**

This section describes the equipment and procedures required for protecting workers against contamination and other workplace hazards except for respiratory protection.

## **7.2. RELATED WORK SPECIFIED ELSEWHERE**

Respiratory Protection is specified in Section 8.

## **7.3. WORKER TRAINING:**

All workers are to be accredited as Abatement Workers as required by the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C), and registered with the Texas Department of State Health Services as Asbestos Abatement Workers.

## **7.4. MEDICAL SURVEILLANCE:**

**A.** All workers involved in the removal of ACM will be medically evaluated in accordance with OSHA and TDSHS regulations. More specifically, each individual who will enter into the regulated area must have a valid medical evaluation which includes, as a minimum, the following:

1. Pulmonary Functions Test,
2. Medical Questionnaire of Work History, and
3. Medical Exam by a Medical Doctor.

**B.** Provide a medical surveillance program and physician's opinion before a respirator is assigned as required by 29 CFR §1910.134 and 29 CFR §1926.103(e)(10).

**C.** Provide medical examination that as a minimum meets OSHA requirements as set forth in 29 CFR §1926.1101. In addition, require that the physician provide an evaluation of the individual's ability to work in environments capable of producing heat stress in the worker.

## **7.5. SUBMITTAL**

**A.** Before start of work, submit the following to AEHS's representative for review. These may be submitted and approved on the start date at the job site. If not approved, work will not begin.

**B. Worker Accreditation and Registration:** Copies of certificates for each worker as evidence that each worker has successfully completed required asbestos training and is certified by the State, as required.

1. **Certificate Worker Acknowledgment:** Submit an original signed copy of the Certificate of



Worker's Acknowledgment found at the end of this section, for each worker who is to be at the job site or enter the Work Area.

**2. Report from Medical Examination:** The report of Medical Examination must have been conducted within last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the Work Area.

## EQUIPMENT

### 7.6. PROTECTIVE CLOTHING

**A. General:** Provide and require the use of protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings for any employee entering into the regulated area.

**B. Coveralls:** Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the Work Area. Provide a sufficient number for all required changes, for all workers in the Work Area.

**C. Additional Protective Clothing:** Provide each worker with the protective clothing as required for sufficient protection against chemical strippers when conducting lead remediation with chemical solvents.

**D. Boots:** Provide work boots with non-skid soles, and where required by OSHA, foot protection, for all workers. Provide boots at no cost to workers. Do not allow boots to be removed from the Work Area for any reason, after being contaminated with ACM.

**E. Goggles:** Provide eye protection (goggles) for all workers as required. Thoroughly clean, decontaminate and bag goggles before removing them from Work Area at the end of the work.

**F. Gloves:** Provide work gloves to all workers and require that they be worn at all times when involved with mastic removal.

## EXECUTION

### 7.7. GENERAL

**A.** Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. The following procedures are minimums to be adhered to regardless of fiber count in the Work Area.

**B.** Each time the Work Area is entered put on disposable coveralls and a clean respirator.

### 7.8. DECONTAMINATION PROCEDURES



Require all workers to remove the disposable coveralls in a designated area.

- Remove the respirator and wash it along with the face, hands, and any other body part.

Require that workers NOT eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the Work Area. To eat, chew, drink or smoke, workers shall follow the procedure described above, then dress in street clothes before entering the non-Work Areas of the building.

## **7.9. CERTIFICATE OF WORKER'S ACKNOWLEDGMENT**

Following this section is a Certificate of Worker Training. After each worker has been included in the Contractor's Respiratory Protection Program, completed the training program, and medical examination, secure a fully executed copy of this form.

**END OF SECTION – 7**



### CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME \_\_\_\_\_ DATE \_\_\_\_\_

PROJECT ADDRESS \_\_\_\_\_

CONTRACTOR'S NAME \_\_\_\_\_

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAVE BEEN LINKED WITH VARIOUS TYPES OF ILLNESSES. IF YOU SMOKE AND INHALE ASBESTOS FIBERS THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.

Your employer's contract with the Owner for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These things are to have been done at no cost to you.

**RESPIRATORY PROTECTION:** You must have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. You must be given a copy of the written respiratory protection manual issued by your employer. You must be equipped at no cost with the respirator to be used on the above project.

**TRAINING COURSE:** You must have been trained in the dangers inherent in handling ACM and breathing asbestos fibers in proper work procedures and personal and area protective measures. This training must have been the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement worker training (40 CFR Part 763, Subpart E, Appendix C).

**MEDICAL EXAMINATION:** You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history, pulmonary function tests and may have included an evaluation of a chest x-ray.

By signing this document you are acknowledging only that the Owner and your employer of the building you are about to work in has advised you of your rights to training and protection relative to your employer.

Signature \_\_\_\_\_ Social Security No. \_\_\_\_\_

Printed Name \_\_\_\_\_ Witness \_\_\_\_\_



## SECTION 8 - RESPIRATORY PROTECTION

*NOTE THAT SIGNIFICANT CHANGES TO THE RESPIRATORY PROTECTION REQUIREMENTS WERE PUBLISHED IN THE FEDERAL REGISTER, JANUARY 1998 and AUGUST 2004.*

### GENERAL

#### 8.1. RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to work of this section.

#### 8.2. DESCRIPTION OF WORK

Instruct and train each worker in proper respiratory use and require that each worker always wear a respirator, properly fitted on the face in the Work Area from the start of any ACM operation. Use respiratory protection appropriate for the fiber level encountered in the work place.

#### 8.3. AIR PURIFYING RESPIRATORS

**A. Respirator Bodies:** Provide half face or full face type respirators. Equip full face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures greater than 50 degrees Fahrenheit.

**B. Filter Cartridges:** Provide, at a minimum, HEPA type filters (P-100) labeled with NIOSH Certification for "Radio nuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with 42 CFR Part 84 and ANSI Z88.2. Also, additional cartridge sections must be added for the mastic/glue removal, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH Certification.

**C. Non-permitted respirators.** Do not use single use, disposable or quarter face respirators.

### EXECUTION

#### 8.4. GENERAL

**A.** Comply with ANSI Z88.2 "Practices for Respiratory Protection" and OSHA 29 CFR §1910.134 and §1926.103.

**B.** Require that a respirator be worn by anyone in the contained area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re-occupancy.



**8.5. FIT TESTING.** The individual performing the fit testing must have attended a Respiratory Protection Class (at least 32 hours) to meet all OSHA requirements or an eight (8) hour negative pressure respiratory protection class if only negative pressure respirators are being used.

**A. Initial Fitting:** Provide initial fitting of respiratory protection during a respiratory protection course of training set up and administered by an individual qualified to do fit testing. Fit types and sizes of respirator to be actually worn by each individual. Allow an individual to use only those respirators for which training and fit testing have been provided.

**B. Upon Each Wearing:** Require that each time an air-purifying respirator is put on it be checked for fit with a positive and negative pressure function check.

#### **8.6. TYPE OF RESPIRATORY PROTECTION REQUIRED**

**A. General:** After reducing airborne contaminant levels to the lowest feasible level with engineering controls and work practices, provide respiratory protection as necessary to ensure that workers are not exposed to an airborne concentration in excess of the Permissible Exposure Limits (PEL).

**B. Specific Respiratory Protection Requirements:** Provide half-face negative pressure air-purifying respirators during installation of Critical or Primary Barriers, removal of asbestos, clean-up activities, bag-out activities, or any other activity which may disturb ACM.

#### **8.7. AIR PURIFYING RESPIRATORS**

**A. Negative pressure - half or full face mask:** Supply a sufficient quantity of respirator filters approved for asbestos, so that workers can change filters during the work day. Require that respirators be wet-rinsed, and filters discarded, each time a worker leaves the Work Area. Require that new filters be installed each time a worker re-enters the Work Area. Store respirators and filters where they are totally protected from exposure to asbestos prior to their use.

**B. Respirator Maintenance:** Maintain respirators in accordance with 29 CFR §1910.134. Specifically, the Contractor shall ensure that all employees using respirators will properly wear, maintain, and clean their individually assigned respirator on a daily basis.

<u>Work Activity</u>	<u>Respirator</u>	
Prep Work	None	N/A
Removal of ACM	Half, Full or PAPR, Negative Pressure	HEPA (P100) + OV
Waste Load-Out and Cleaning	Half Face, Negative Pressure	HEPA (P-100) Filtered

#### **C. Other.**

Before beginning work with any material for which a Material Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.

**END OF SECTION – 8**



## **SECTION 9 – PROJECT DECONTAMINATION**

### **GENERAL**

**9.1. SUMMARY** – Two visual and one aggressive air sampling clearance will be required if containment is present.

- A.** The first visual clearance will be to ensure that all asbestos has been removed.
- B.** The second visual clearance will be to ensure that clean-up has occurred and the containment (s) is/are ready for aggressive air sampling.

### **EXECUTION**

#### **9.2. CLEANING THE WORK AREA**

- A.** Pre-cleaning will occur via HEPA vacuuming all floors and horizontal surfaces.
- B.** After abatement, all areas will be HEPA vacuumed and wet wiped with amended water even if containment is not used. This means M003 will be cleaned in its entirety.

#### **9.3. CERTIFICATE OF VISUAL INSPECTION**

Following this section is a "Certificate of Visual Inspection". This certification is to be completed by the Contractor and certified by the Consulting Agency's representative. Submit completed Certificate with Application for Final Payment. Final payment will not be made until this Certification is executed.

**END OF SECTION – 9**





### **CERTIFICATION OF VISUAL INSPECTION**

In accordance with this Specification, the Contractor hereby certifies that he has visually inspected the Work Area (all surfaces including pipes, beams, ledges, walls, ceiling and floor, decontamination unit, sheet plastic, etc.) and has found no dust, debris or residue.

by: (Signature)\_\_\_\_\_ Date\_\_\_\_\_

(Print Name)\_\_\_\_\_

(Print Title)\_\_\_\_\_

### **Consulting Agency's Representative CERTIFICATION**

The Consulting Agency's Representative hereby certifies that he has accompanied the Contractor on the Contractor's visual inspection and verifies that this inspection has been thorough and to the best of their knowledge and belief, the Contractor's Certification above is a true and honest one.

by: (Signature)\_\_\_\_\_ Date\_\_\_\_\_

(Print Name)\_\_\_\_\_

(Print Title)\_\_\_\_\_



## SECTION 10 - REMOVAL OF ASBESTOS-CONTAINING MATERIALS

### REMOVAL

#### 10.1. TSI Removal (Joints and Insulation).

##### A. Option 1: Glove bagging.

1. Two layers of 6 mil thick poly will be used as critical barriers.
2. One layer of 4 mil thick poly will be installed to separate the area where work will not take place.
3. Two layers of 6 mil thick poly will be used as critical barriers.
4. A bag-out room is necessary. All removed material will be transported to the outside in covered containers.
5. A two chamber decontamination unit is required with two buckets of water.
6. All personnel will be double suited with disposable coveralls. The first suit will be removed inside containment with the second in the first chamber of the decontamination unit where washing will occur.
7. All personnel will wear, at a minimum, ½ face piece respirators with P-100 filters. As appropriate, dual organic vapor cartridges will be used. If the mastic/glue remover's MSDS requires different respiratory protection, the most stringent will be used.

##### 8. Procedures.

- Remove the TSI by glove bagging and place poly on the ground underneath the active glove bagging. After removal, place the glove bags and poly in 6 mil thick bags
  - Do not fill more than 1/3 full
  - Wipe bag with a wet (amended water) cloth
  - Place first bag into second 6 mil thick bag, seal, and gooseneck
  - Pass the bag to the bag accumulation area

##### B. Option 2: Full Containment.

1. Pre-clean the room by removing debris and HEPA vacuuming.
2. Establish full containment to include two layers of 4 mil thick poly on the walls and critical barriers of 6 mil thick poly.
3. Establish a full decontamination unit equipped with a shower.



**4. Remove the TSI.**

- Wrap the large pieces in two layers of six mil thick poly
  - Wipe the poly with a wet (amended water) cloth
  - Pass the removed pieces to the bag accumulation area
- Place in 6 mil thick bags
  - Do not fill more than 1/3 full
  - Wipe bag with a wet (amended water) cloth
  - Place first bag into second 6 mil thick bag, seal, and gooseneck
  - Pass the bags to the bag accumulation area

**5.** Cover all items that will not be removed; however access to electrical panel, controls, are required to be maintained.

**6.** Multiple containments may be required in lieu of one large one.

**10.2. Post Abatement Cleaning.**

All surfaces within M003 will be HEPA vacuumed and wet wiped with amended water.

**END OF SECTION - 10**

**SECTION 11 - DISPOSAL OF REGULATED ASBESTOS-CONTAINING MATERIAL**

**GENERAL**

**11.1. RELATED DOCUMENTS**

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this section as appropriate.

**11.2. DESCRIPTION OF THE WORK**

This section describes the disposal of Regulated Asbestos-Containing Materials (RACM). Disposal includes packaging of Regulated Asbestos-Containing Materials and disposing of it in a licensed regulated landfill. The TSI is RACM.

**11.3. SUBMITTAL**

**A. Before Start of Work:** Submit the following to the Consulting Agency Representative for review. These may be submitted and approved on the start date at the job site. If not approved, work will not begin until corrections have been accomplished.



1. Copy of state or local license for waste hauler.
2. Name and address of landfill where Regulated Asbestos Containing Materials are to be buried. Include contact person and telephone number.
3. Chain of Custody form and form of waste manifest proposed.
4. Special or Hazardous Waste Signs for Waste Vehicle or Container IAW Federal and State laws and regulation for type material.

**B. Waste Shipment Record:** Maintain a waste shipment record as required by the TDSHS regulation which indicates the waste generator, transporter, and disposal site, and which describes the nature, size, type of container, and form of asbestos waste. **The owner (Mr. Terry Meeker) will sign all waste manifests – 210-617-5300, extension 15170.**

**C. Certificate of Disposal:** Provide a copy of the final disposal certificate to the owner within 30 days of completion of the project.

#### 11.4. MATERIALS

**A. Disposal Bags:** Provide 6 mil (0.15 mm) thick leak-tight polyethylene bags labeled with three labels with text as follows:

1. **First Label:** Provide in accordance with 29 CFR §1910.1200(f) of OSHA's Hazard Communication standard and 29 CFR §1926.1101 (k) (8) (iii):

DANGER  
CONTAINS ASBESTOS FIBERS  
AVOID CREATING DUST  
CANCER AND LUNG DISEASE HAZARD  
BREATHING AIRBORNE FIBERS IS  
HAZARDOUS TO YOUR HEALTH

2. **Second Label:** Provide in accordance with U. S. Department of Transportation regulation on hazardous waste marking. 49 CFR parts 171 and 172. Hazardous Substances

RQ-ASBESTOS WASTE  
CLASS 9  
NA2212-PG III

3. **Third Label:** Provide the name of the waste generator (Owner's name), the location from which the waste was generated and the names and addresses of the contractor and transporter. This label must be durable, able to repel dirt and moisture (e.g., permanent marker). Label must be placed directly on disposal bag(s) in a legible format.



## EXECUTION

### 11.5. GENERAL

- A. All waste is to be hauled by a waste hauler with all required licenses from all state and local authority with jurisdiction.
- B. Load all adequately wetted (amended water) Regulated Asbestos-Containing Material in disposal bags or leak-tight containers.
- C. Protect interior of truck/trailer or disposal container with Critical and Primary Barriers.
- D. Carefully load containerized waste in fully enclosed disposal containers, trucks or other appropriate vehicles for transport. Exercise care before and during transport, to insure that no unauthorized persons have access to the material.
- E. During loading and unloading mark disposal containers, receptacles and vehicles with a sign complying with requirements of the EPA NESHAP regulation (40 CFR Part 61), in a manner and location that a person can read the following legend:

DANGER  
ASBESTOS DUST HAZARD  
CANCER AND LUNG DISEASE HAZARD  
Authorized Personnel Only

- F. Do not store containerized materials outside of the Work Area. Take containers from the Work Area directly to a sealed truck or disposal container.
- G. Do not transport disposal bagged materials on open trucks. Label drums with same warning labels as bags. Uncontaminated drums may be reused. Treat drums that have been contaminated as Regulated Asbestos-Containing Material and dispose of in accordance with this specification.
- H. Advise the landfill operator or processor, at least ten days in advance of transport, of the quantity of material to be delivered.
- I. At disposal site unload containerized waste:
  - 1. At a disposal site, sealed plastic bags may be carefully unloaded from the truck. If bags are broken or damaged, return to work site for re-bagging.
  - 2. At a processing site truck and loading dock are arranged as a controlled work area and containerized waste is transferred to storage area by site personnel. All bags including broken ones (after re-bagging) will be transferred.



**J.** Retain receipts from landfill or processor for materials disposed of the ACM waste. At the completion of hauling and disposal of each load submit copy of waste manifest, chain of custody form, and landfill receipt to the owner and a copy to AEHS.

**END OF SECTION – 11**

**END OF SPECIFICATIONS**

